

| WASTE STREAM | 3K315 | Decommissioning Stage 3: Mild Steel (Reactor) LLW |
|--------------|-------|---------------------------------------------------|
|--------------|-------|---------------------------------------------------|

**SITE** Hartlepool

**SITE OWNER** EDF Energy Nuclear Generation Ltd (EDFE NGL)

**WASTE CUSTODIAN** EDF Energy Nuclear Generation Ltd (EDFE NGL)

**WASTE TYPE** LLW

#### WASTE VOLUMES

|                        | Reported (m <sup>3</sup> )   | OR | Conditioned (m <sup>3</sup> ) | Packaged (m <sup>3</sup> ) |
|------------------------|------------------------------|----|-------------------------------|----------------------------|
| Stocks:                | At 1.4.2025 = 0              |    |                               |                            |
| Future arisings:       | 1.4.2025 - 31.3.2115 = 0     |    |                               |                            |
|                        | 1.4.2115 - 31.3.2116 = 468.9 |    |                               |                            |
|                        | 1.4.2116 - 31.3.2117 = 514.2 |    |                               |                            |
|                        | 1.4.2117 - 31.3.2118 = 439.8 |    |                               |                            |
| Total future arisings: | <b>1422.9</b>                |    |                               |                            |
| Total waste volume:    | <b>1422.9</b>                |    |                               |                            |

Number of waste packages in stock: At 1.4.2025..... - packages

Comment on arising rates: Waste volumes will be variable depending on station operating conditions.

Additional information on quantities: Volumes based on Back to Bio Shield strategy. Work is ongoing looking at optimising the strategy which could lead to a change in volume and timings of arisings across Final Site Clearance wastes (300s) and Pre C&M wastes (100s), in future submissions.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 1.50  
Stock (lower): x - Arisings (lower): x 0.50

**WASTE SOURCE** Mild steel items from the reactor structure.

#### PHYSICAL CHARACTERISTICS

General description: A variety of mild steel items. Waste can be packaged in standard NDA packages.

Changes since waste generated: -

Bulk density (t/m<sup>3</sup>): ~ 1.4

Comment on density: The density is of the waste as cut for packaging.

#### CHEMICAL COMPOSITION

General description and components (%wt): A variety of mild steels (100%) with possible traces of other metals.

Chemical state: -

Sheet metal proportion / thickness: The waste will be bulk metal items which have been cut for packaging. Metal thicknesses will range from a few mm to about 50mm.

Metals and alloys (%wt):

|                           | (%wt)   | Type(s) / Grades(s) with proportions | % of total C14 activity |
|---------------------------|---------|--------------------------------------|-------------------------|
| Stainless steel.....      | = 0     | -                                    | 100.0                   |
| Other ferrous metals..... | = 100.0 | -                                    |                         |
| Iron.....                 | = 0     | -                                    |                         |
| Aluminium.....            | = 0     | -                                    |                         |
| Beryllium.....            | = 0     | -                                    |                         |
| Cobalt.....               | = 0     | -                                    |                         |
| Copper.....               | = 0     | -                                    |                         |
| Lead.....                 | = 0     | -                                    |                         |
| Magnox/Magnesium.....     | = 0     | -                                    |                         |
| Nickel.....               | = 0     | -                                    |                         |
| Titanium.....             | = 0     | -                                    |                         |
| Uranium.....              | = 0     | -                                    |                         |
| Zinc.....                 | = 0     | -                                    |                         |
| Zircaloy/Zirconium.....   | = 0     | -                                    |                         |
| Other metals.....         | = 0     | -                                    |                         |

Organics (%wt):

|                                     | (%wt) | Type(s) and comment | % of total C14 activity |
|-------------------------------------|-------|---------------------|-------------------------|
| Total cellulose.....                | = 0   | -                   |                         |
| Paper, cotton.....                  | = 0   | -                   |                         |
| Wood.....                           | = 0   | -                   |                         |
| Halogenated plastics.....           | = 0   | -                   |                         |
| Total non-halogenated plastics..... | = 0   | -                   |                         |
| Condensation polymers.....          | = 0   | -                   |                         |
| Others.....                         | = 0   | -                   |                         |
| Organic ion exchange materials..... | = 0   | -                   |                         |
| Total rubber.....                   | = 0   | -                   |                         |
| Halogenated rubber.....             | = 0   | -                   |                         |
| Non-halogenated rubber.....         | = 0   | -                   |                         |
| Hydrocarbons.....                   | = 0   | -                   |                         |
| Oil or grease.....                  | -     | -                   |                         |
| Fuel.....                           | -     | -                   |                         |
| Asphalt/Tarmac (cont.coal tar)..... | -     | -                   |                         |
| Asphalt/Tarmac (no coal tar).....   | -     | -                   |                         |
| Bitumen.....                        | -     | -                   |                         |
| Others.....                         | -     | -                   |                         |
| Other organics.....                 | = 0   | -                   |                         |

Other materials (%wt):

|                                       | (%wt) | Type(s) and comment | % of total C14 activity |
|---------------------------------------|-------|---------------------|-------------------------|
| Inorganic ion exchange materials..... | = 0   | -                   |                         |
| Inorganic sludges and flocs.....      | = 0   | -                   |                         |
| Soil.....                             | = 0   | -                   |                         |
| Brick/Stone/Rubble.....               | = 0   | -                   |                         |
| Cementitious material.....            | = 0   | -                   |                         |
| Sand.....                             | = 0   | -                   |                         |
| Glass/Ceramics.....                   | = 0   | -                   |                         |
| Graphite.....                         | = 0   | -                   |                         |
| Desiccants/Catalysts.....             | = 0   | -                   |                         |
| Asbestos.....                         | = 0   | -                   |                         |
| Non/low friable.....                  | -     | -                   |                         |
| Moderately friable.....               | -     | -                   |                         |
| Highly friable.....                   | -     | -                   |                         |
| Free aqueous liquids.....             | = 0   | -                   |                         |
| Free non-aqueous liquids.....         | = 0   | -                   |                         |
| Powder/Ash.....                       | = 0   | -                   |                         |

#### COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

|                | (%wt) | Type(s) and comment |
|----------------|-------|---------------------|
| Fluoride.....  | = 0   | -                   |
| Chloride.....  | = 0   | -                   |
| Iodide.....    | = 0   | -                   |
| Cyanide.....   | = 0   | -                   |
| Carbonate..... | = 0   | -                   |
| Nitrate.....   | = 0   | -                   |
| Nitrite.....   | = 0   | -                   |
| Phosphate..... | = 0   | -                   |
| Sulphate.....  | = 0   | -                   |
| Sulphide.....  | = 0   | -                   |

Materials of interest for waste acceptance criteria:

|                                                | (%wt) | Type(s) and comment |
|------------------------------------------------|-------|---------------------|
| Combustible metals.....                        | = 0   | -                   |
| Low flash point liquids.....                   | = 0   | -                   |
| Explosive materials.....                       | = 0   | -                   |
| Phosphorus.....                                | = 0   | -                   |
| Hydrides.....                                  | = 0   | -                   |
| Biological etc. materials.....                 | = 0   | -                   |
| Biodegradable materials.....                   | = 0   | -                   |
| Putrescible wastes.....                        | = 0   | -                   |
| Non-putrescible wastes.....                    | = 0   | -                   |
| Corrosive materials.....                       | = 0   | -                   |
| Pyrophoric materials.....                      | = 0   | -                   |
| Generating toxic gases.....                    | = 0   | -                   |
| Reacting with water.....                       | = 0   | -                   |
| Higher activity particles.....                 | P     | Not expected.       |
| Soluble solids as bulk chemical compounds..... | = 0   | -                   |

Hazardous substances / non hazardous pollutants:

|                             | (%wt) | Type(s) and comment |
|-----------------------------|-------|---------------------|
| Acrylamide.....             | NE    | -                   |
| Benzene.....                | NE    | -                   |
| Chlorinated solvents.....   | NE    | -                   |
| Formaldehyde.....           | NE    | -                   |
| Organometallics.....        | NE    | -                   |
| Phenol.....                 | NE    | -                   |
| Styrene.....                | NE    | -                   |
| Tri-butyl phosphate.....    | NE    | -                   |
| Other organophosphates..... | NE    | -                   |
| Vinyl chloride.....         | NE    | -                   |
| Arsenic.....                | NE    | -                   |
| Barium.....                 | NE    | -                   |
| Boron.....                  | NE    | -                   |
| Boron (in Boral).....       | NE    | -                   |
| Boron (non-Boral).....      | NE    | -                   |
| Cadmium.....                | NE    | -                   |
| Caesium.....                | NE    | -                   |
| Selenium.....               | NE    | -                   |
| Chromium.....               | NE    | -                   |
| Molybdenum.....             | NE    | -                   |
| Thallium.....               | NE    | -                   |
| Tin.....                    | NE    | -                   |
| Vanadium.....               | NE    | -                   |
| Mercury compounds.....      | NE    | -                   |
| Others.....                 | NE    | -                   |

Complexing agents (%wt):

| Not yet determined             |       |                                |
|--------------------------------|-------|--------------------------------|
|                                | (%wt) | Type(s) and comment            |
| EDTA.....                      | NE    | -                              |
| DPTA.....                      | NE    | -                              |
| NTA.....                       | NE    | -                              |
| Polycarboxylic acids.....      | NE    | -                              |
| Other organic complexants..... | NE    | Only trace quantities, if any. |
| Total complexing agents.....   | NE    | -                              |

Physical components:

|                                         | Number | Type(s) and comment |
|-----------------------------------------|--------|---------------------|
| Sources.....                            | = 0    | -                   |
| Electronic & Electrical Equipment (EEE) |        |                     |
| EEE Type 1.....                         |        | -                   |
| EEE Type 2.....                         |        | -                   |
| EEE Type 3.....                         |        | -                   |
| EEE Type 4.....                         |        | -                   |
| EEE Type 5.....                         |        | -                   |

## TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

| Treatment                                                  | On-site / Off-site | Stream volume % |
|------------------------------------------------------------|--------------------|-----------------|
| Size reduction                                             | Off-site           | ~ 80.0          |
| Decay storage                                              |                    |                 |
| Low force compaction                                       |                    |                 |
| Supercompaction (HFC)                                      |                    |                 |
| Incineration                                               |                    |                 |
| Drying/dewatering/liquid separation                        |                    |                 |
| Tie down/fixatives/strippable coating/painting application |                    |                 |
| Decontamination                                            |                    |                 |
| Metal treatment                                            |                    |                 |
| Recycling / reuse                                          |                    |                 |
| Thermal treatment, including vitrification                 |                    |                 |
| Encapsulation                                              |                    |                 |
| Polymer encapsulation                                      |                    |                 |
| Other physical treatment                                   |                    |                 |
| Other chemical treatment                                   |                    |                 |
| Containerisation                                           |                    | ~ 20.0          |
| Treatment not yet determined                               |                    |                 |
| None                                                       |                    |                 |

Comments on planned treatments:

Approximately 80% of the waste will be suitable for decontamination and melting and 95% is expected to be suitable for re-use. Hence the 0.05 volume change factor.

Conditioning method:

-

Conditioning plants:

| Plant Name | Location |
|------------|----------|
|            |          |

Likely conditioning matrix:

-

Further information on the conditioning matrix:

-

**Waste Packaging:**

| Likely container type: | Container                                          | Waste packaged (vol%) | Waste loading (m³) | Payload (m³) | Number of packages | Estimated start date for packaging |
|------------------------|----------------------------------------------------|-----------------------|--------------------|--------------|--------------------|------------------------------------|
|                        | 1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02) | 24.0                  | 14.8               | 18.3         | 24                 | -                                  |

Range in container waste loading:

Other information on packaging and conditioning: -

Conditioned density (t/m³): -  
Conditioned density comment: -

**Management Routes:**

| Disposal Route                                                                     | Stream volume % | Raw density t/m³ | Start date |
|------------------------------------------------------------------------------------|-----------------|------------------|------------|
| Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland) |                 |                  |            |
| Expected to be Non-NSD HAW managed under Scottish Government's policy              |                 |                  |            |
| Expected to be disposed to LLW Vaults NRS Dounreay                                 |                 |                  |            |
| Expected to be consigned to the Geological Disposal Facility                       |                 |                  |            |
| Expected to be consigned to a Near Surface Disposal Facility                       |                 |                  |            |
| Expected to be consigned to the LLW Repository                                     | ~ 24.0          | ~ 1.4            |            |
| Expected to be consigned to a Landfill Facility                                    |                 |                  |            |
| Expected to be disposed On-Site                                                    |                 |                  |            |
| Expected to be managed by In-Situ Disposal                                         |                 |                  |            |
| Expected to be consigned to an Incineration Facility                               |                 |                  |            |
| Expected to be consigned to a Metal Treatment Facility                             | ~ 76.0          | ~ 1.4            |            |
| Expected to be Out of Scope                                                        |                 |                  |            |
| Expected to be recycled / reused                                                   |                 |                  |            |
| Disposal route not known                                                           |                 |                  |            |

Classification codes for waste expected to be consigned to a landfill facility:

Opportunities for alternative disposal routing: No

| Baseline Management Route | Opportunity Management Route | Stream volume (%) | Opportunity Confidence | Comment |
|---------------------------|------------------------------|-------------------|------------------------|---------|
| -                         | -                            | -                 | -                      | -       |

**RADIOACTIVITY**

Source: Activation of the mild steel and its impurities.

Uncertainty: The values quoted were derived by calculation from available material specifications and are indicative of the activities that are to be expected. A major source of uncertainty is the impurity levels.

Measurement of radioactivities: Activation/decay calculations based on neutron flux and operating history. The activities quoted are for the time at which this waste will arise (i.e. ~85 years after end of generation). There may be some contamination by Cs137.

Chemical form of radionuclides:

- H-3: Diffused into matrix
- C-14: Incorporated in the steel. There may be some surface contamination as graphite.
- Cl-36: The chlorine will be incorporated in the steel
- Se-79: Selenium content not expected to be significant
- Tc-99: Not determined
- I-129: Not significant
- Ra: Radium content is insignificant
- Th: Thorium content is insignificant
- U: Uranium content is insignificant
- Np: Neptunium content is insignificant
- Pu: Plutonium content is insignificant

| WASTE STREAM 3K315 Decommissioning Stage 3: Mild Steel (Reactor) LLW |                            |                |                 |                |                  |                            |                |                 |                |
|----------------------------------------------------------------------|----------------------------|----------------|-----------------|----------------|------------------|----------------------------|----------------|-----------------|----------------|
| Nuclide                                                              | Mean radioactivity, TBq/m³ |                |                 |                | Nuclide          | Mean radioactivity, TBq/m³ |                |                 |                |
|                                                                      | Waste at 1.4.2025          | Bands and Code | Future Arisings | Bands and Code |                  | Waste at 1.4.2025          | Bands and Code | Future Arisings | Bands and Code |
| H 3                                                                  |                            |                |                 | 8              | Gd 153           |                            |                |                 |                |
| Be 10                                                                |                            |                |                 | 8              | Ho 163           |                            |                |                 |                |
| C 14                                                                 |                            |                | 7.47E-05        | C C 2          | Ho 166m          |                            |                |                 |                |
| Na 22                                                                |                            |                |                 | 4              | Tm 170           |                            |                |                 |                |
| Al 26                                                                |                            |                |                 | 4              | Tm 171           |                            |                |                 |                |
| Cl 36                                                                |                            |                | 2.00E-08        | C C 2          | Lu 174           |                            |                |                 |                |
| Ar 39                                                                |                            |                |                 |                | Lu 176           |                            |                |                 |                |
| Ar 42                                                                |                            |                |                 |                | Hf 178n          |                            |                |                 |                |
| K 40                                                                 |                            |                |                 |                | Hf 182           |                            |                |                 |                |
| Ca 41                                                                |                            |                |                 | 8              | Pt 193           |                            |                |                 |                |
| Mn 53                                                                |                            |                |                 |                | Tl 204           |                            |                |                 |                |
| Mn 54                                                                |                            |                |                 | 8              | Pb 205           |                            |                |                 |                |
| Fe 55                                                                |                            |                |                 | 8              | Pb 210           |                            |                |                 | 8              |
| Co 60                                                                |                            |                | 1.17E-06        | C C 2          | Bi 208           |                            |                |                 |                |
| Ni 59                                                                |                            |                | 1.35E-05        | C C 2          | Bi 210m          |                            |                |                 |                |
| Ni 63                                                                |                            |                | 7.77E-04        | C C 2          | Po 210           |                            |                |                 | 8              |
| Zn 65                                                                |                            |                |                 | 8              | Ra 223           |                            |                |                 |                |
| Se 79                                                                |                            |                |                 | 8              | Ra 225           |                            |                |                 |                |
| Kr 81                                                                |                            |                |                 |                | Ra 226           |                            |                |                 | 8              |
| Kr 85                                                                |                            |                |                 |                | Ra 228           |                            |                |                 |                |
| Rb 87                                                                |                            |                |                 |                | Ac 227           |                            |                |                 |                |
| Sr 90                                                                |                            |                |                 | 8              | Th 227           |                            |                |                 |                |
| Zr 93                                                                |                            |                |                 | 8              | Th 228           |                            |                |                 |                |
| Nb 91                                                                |                            |                |                 |                | Th 229           |                            |                |                 | 8              |
| Nb 92                                                                |                            |                |                 |                | Th 230           |                            |                |                 | 8              |
| Nb 93m                                                               |                            |                | 1.49E-07        | C C 2          | Th 232           |                            |                |                 | 8              |
| Nb 94                                                                |                            |                | 2.70E-07        | C C 2          | Th 234           |                            |                |                 |                |
| Mo 93                                                                |                            |                | 8.94E-07        | C C 2          | Pa 231           |                            |                |                 | 8              |
| Tc 97                                                                |                            |                |                 |                | Pa 233           |                            |                |                 |                |
| Tc 99                                                                |                            |                | 1.89E-07        | C C 2          | U 232            |                            |                |                 |                |
| Ru 106                                                               |                            |                |                 | 8              | U 233            |                            |                |                 | 8              |
| Pd 107                                                               |                            |                |                 | 8              | U 234            |                            |                |                 | 8              |
| Ag 108m                                                              |                            |                | 1.09E-07        | C C 2          | U 235            |                            |                |                 | 8              |
| Ag 110m                                                              |                            |                |                 |                | U 236            |                            |                |                 | 8              |
| Cd 109                                                               |                            |                |                 |                | U 238            |                            |                |                 | 8              |
| Cd 113m                                                              |                            |                |                 |                | Np 237           |                            |                |                 | 8              |
| Sn 119m                                                              |                            |                |                 |                | Pu 236           |                            |                |                 |                |
| Sn 121m                                                              |                            |                |                 | 8              | Pu 238           |                            |                |                 | 8              |
| Sn 123                                                               |                            |                |                 |                | Pu 239           |                            |                |                 | 8              |
| Sn 126                                                               |                            |                |                 | 8              | Pu 240           |                            |                |                 | 8              |
| Sb 125                                                               |                            |                |                 |                | Pu 241           |                            |                |                 | 8              |
| Sb 126                                                               |                            |                |                 |                | Pu 242           |                            |                |                 | 8              |
| Te 125m                                                              |                            |                |                 |                | Am 241           |                            |                |                 | 8              |
| Te 127m                                                              |                            |                |                 |                | Am 242m          |                            |                |                 | 8              |
| I 129                                                                |                            |                |                 | 8              | Am 243           |                            |                |                 | 8              |
| Cs 134                                                               |                            |                |                 | 8              | Cm 242           |                            |                |                 | 8              |
| Cs 135                                                               |                            |                |                 | 8              | Cm 243           |                            |                |                 | 8              |
| Cs 137                                                               |                            |                |                 | 8              | Cm 244           |                            |                |                 | 8              |
| Ba 133                                                               |                            |                |                 |                | Cm 245           |                            |                |                 | 8              |
| La 137                                                               |                            |                |                 |                | Cm 246           |                            |                |                 | 8              |
| La 138                                                               |                            |                |                 |                | Cm 248           |                            |                |                 |                |
| Ce 144                                                               |                            |                |                 | 8              | Cf 249           |                            |                |                 |                |
| Pm 145                                                               |                            |                |                 |                | Cf 250           |                            |                |                 |                |
| Pm 147                                                               |                            |                |                 | 8              | Cf 251           |                            |                |                 |                |
| Sm 147                                                               |                            |                |                 |                | Cf 252           |                            |                |                 |                |
| Sm 151                                                               |                            |                |                 | 8              | Unsp a           |                            |                |                 | 8              |
| Eu 152                                                               |                            |                |                 | 8              | Unsp b/g         |                            |                |                 | 8              |
| Eu 154                                                               |                            |                |                 | 8              | <b>Total a</b>   | <b>0</b>                   | <b>*</b>       | <b>0</b>        | <b>*</b>       |
| Eu 155                                                               |                            |                |                 | 8              | <b>Total b/g</b> | <b>0</b>                   | <b>*</b>       | <b>8.68E-04</b> | <b>*</b>       |

#### Bands (Upper and Lower)

A a factor of 1.5  
B a factor of 3  
C a factor of 10  
D a factor of 100  
E a factor of 1000

Note: Bands quantify uncertainty in the mean radioactivity.

#### Code

1 Measured activity  
2 Derived activity (best estimate)  
3 Derived activity (upper limit)  
4 Not present  
5 Present but not significant  
6 Likely to be present but not assessed  
7 Present in significant quantities but not determined  
8 Not expected to be present in significant quantity  
\* Total calculated from the 114 declared radionuclides